

LineUp With Math™ Air Traffic Control Simulator

How to Introduce the Simulator to Teachers and Students in 5 Minutes



www.atcsim.nasa.gov

Getting Started—Part 1 of 5



- The Smart Skies™ “LineUp With Math™” Simulator can be demonstrated to students, teachers, parents, chapter leaders, etc.
- A brief demonstration (such as at a booth in a show) will:
 - Introduce Air Traffic Control (using an animation of a day in the life of the National Airspace System)
 - Introduce the Air Traffic Control sector layout.
 - Run and solve a representative Simulator problem.
 - Demonstrate the Simulator controls.
 - Demonstrate tactics for analyzing and solving air traffic control problems.
 - Demonstrate proportional reasoning for a simple speed change.

Getting Started—Part 2 of 5



- Visit www.atcsim.nasa.gov
- Open the Simulator in a browser window
 - For venues with a reliable Internet connection, click the link “Air Traffic Control Simulator” to run the Simulator in your browser.
 - For venues **without** an Internet connection, you can download a “demo” version of the Simulator:
 - click the button “Download a Demo Version”.
 - follow the directions to download and open the **latest version** of the demo Simulator.

Getting Started—Part 3 of 5



- If you wish, you can support your Simulator demo with 2-3 QuickTime movies
- To open the first 2 movies, visit www.atcsim.nasa.gov
- Click the Videos button in the navigation bar at the top of the page
 - Download and open the movie “Animation of 24 hours of flight in the U.S.”
 - Download and open the movie “Welcome to Sector 33”
- You can also supplement this demo with the movie “SmartSkies™ DemoProb3-8” available at:
www.smartskies.nasa.gov/museum

Getting Started—Part 4 of 5



- Online support for the Simulator:
Visit www.atcsim.nasa.gov for
 - Simulator Quick Start Guide
 - Animated Simulator Tutorial
- Student workbooks and teacher support materials are free and available online at: www.smartskies.nasa.gov/lineup
- Contacts:
 - Bill Preston – Air Traffic Control Specialist
bill.preston@nasa.gov (650) 604-2174
 - Greg Condon – Project Lead
gregory.condon@nasa.gov (650) 604-5567
 - Miriam Landesman – Education Lead
smartskies@mail.nasa.gov

NOTE:

The following slides are NOT meant for presentation to students.

Rather, they can serve as an illustrated checklist to guide you as you demonstrate the Simulator.

1. Select a Problem



LineUp With Math™ Simulator
Solving NASA Problem 2-1

00:00
Target
3:24

MOD OAL TPH LIDAT

AAL12
600 kts

DAL88
600 kts

Sector 3

- ☐ Problem 3-1
- ☐ Problem 3-2
- ☐ Problem 3-3
- ☐ Problem 3-4
- ☐ Problem 3-5
- ☐ Problem 3-6
- ☐ Problem 3-7
- ☐ Problem 3-8
- ☐ Problem 3-9
- ☐ Problem 3-10
- ☐ Problem 3-11
- ☐ Problem 3-12

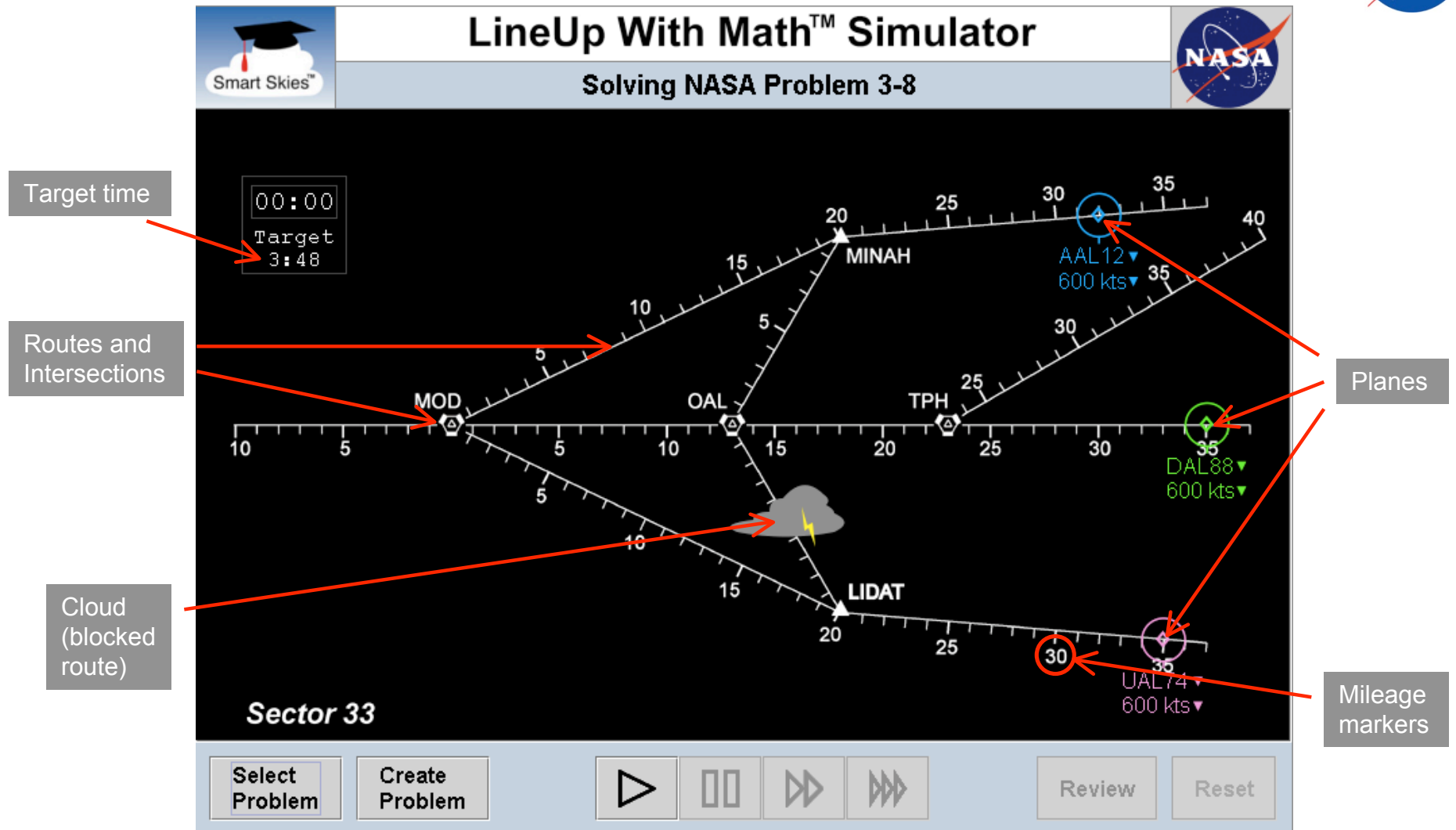
Select Problem

- 2 planes ▸
- 3 planes ▸
- 4 planes ▸
- 5 planes ▸

Review Reset

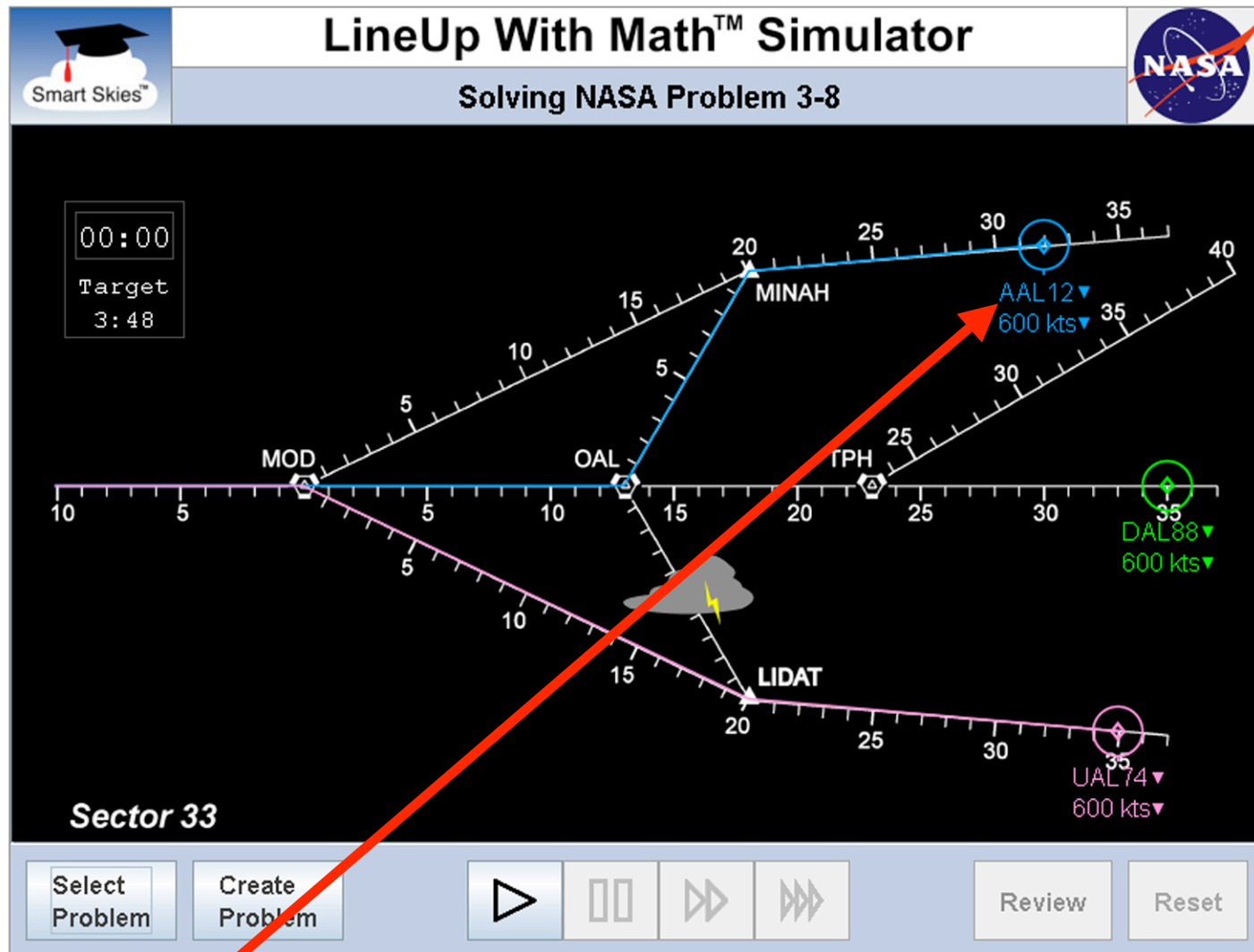
☐ Pick Problem 3-8.

2. Introduce Problem 3-8



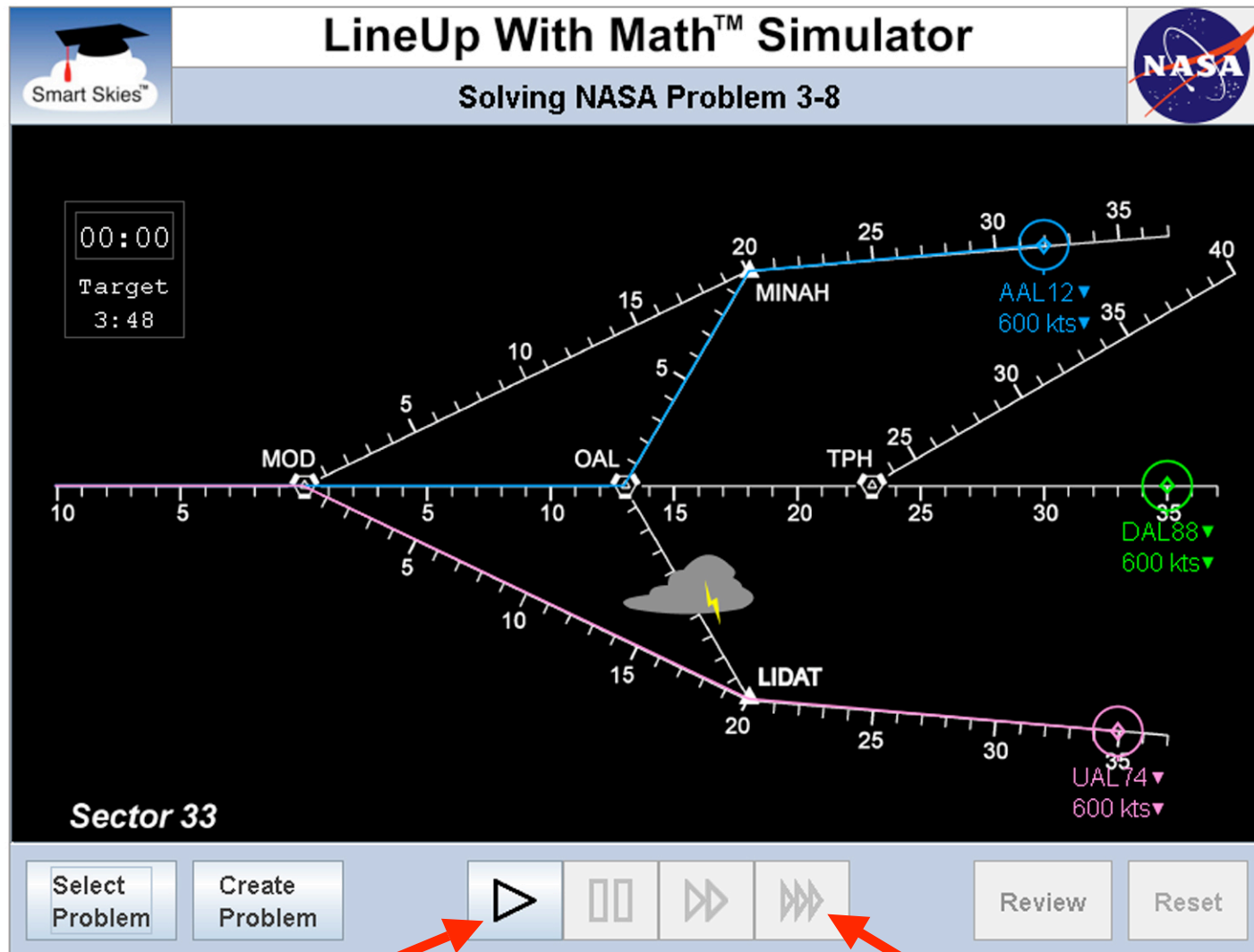
- ❑ Scenario: Three aircraft bound for SFO merging over MOD.
- ❑ Goal: Achieve 3 NM spacing with the last aircraft at MOD by 3:48.
- ❑ Strategy: Identify conflicts. To resolve, change plane route(s) or speed(s).

3. Display the Routes



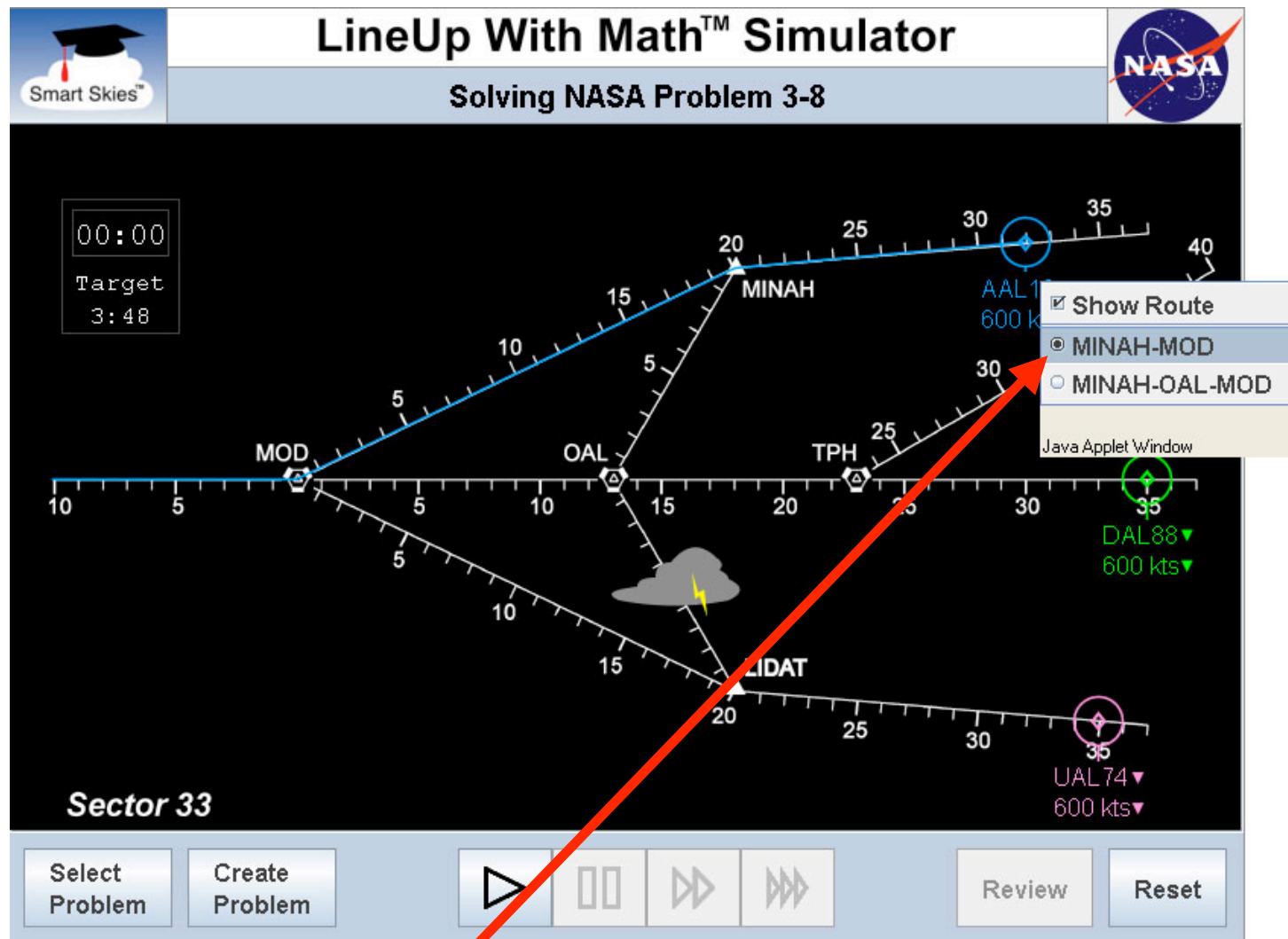
- ❑ Click callsign(s) to display route(s).
- ❑ Note: Each plane is 35 NM flying distance from MOD and is flying at 600 kts.
- ❑ There is a conflict (more than one)!

4. Run the Problem



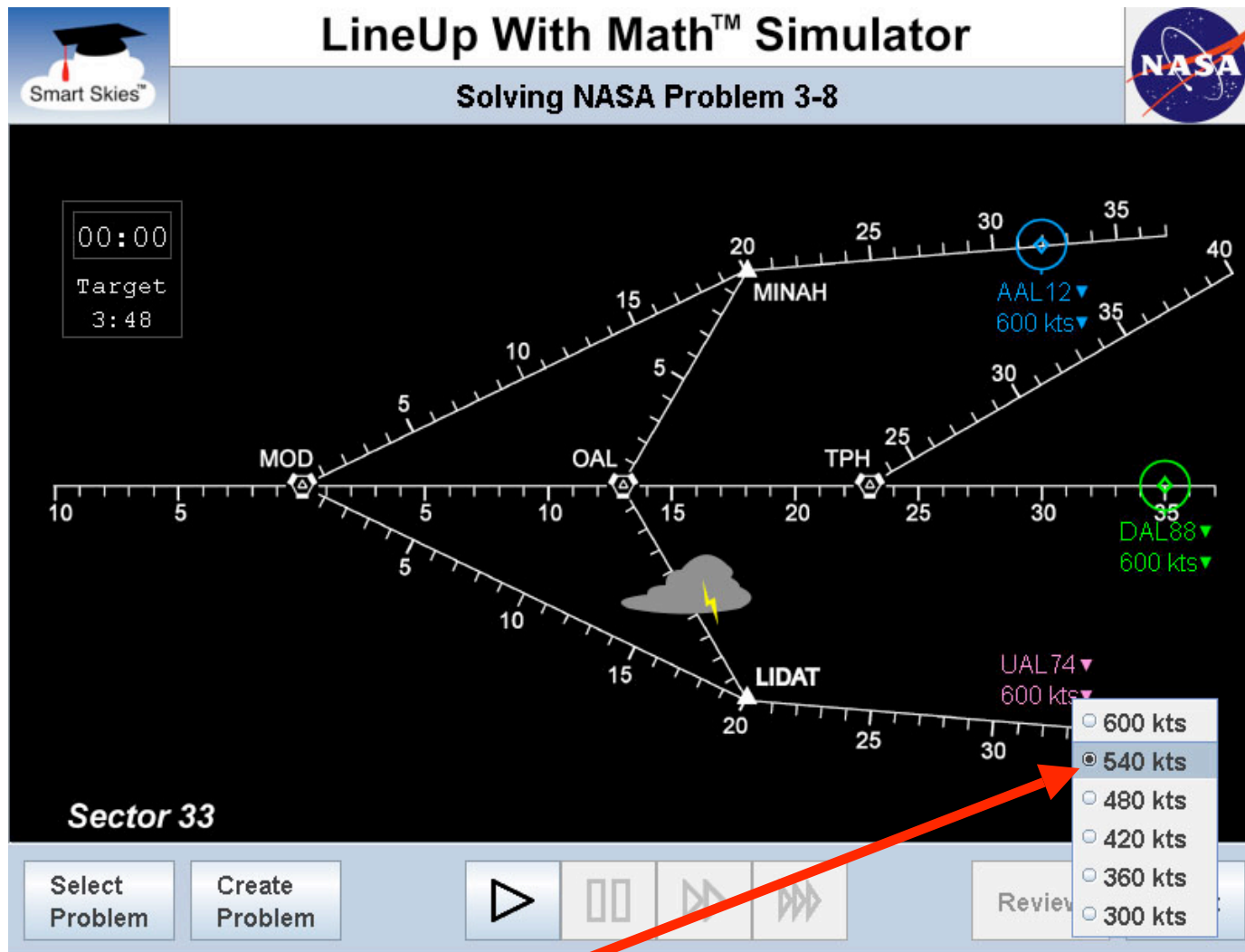
- ❑ Run the Simulator to demonstrate the conflicts.
- ❑ Once the problem begins to run, can use the fast-forward mode.

5. Change a Route



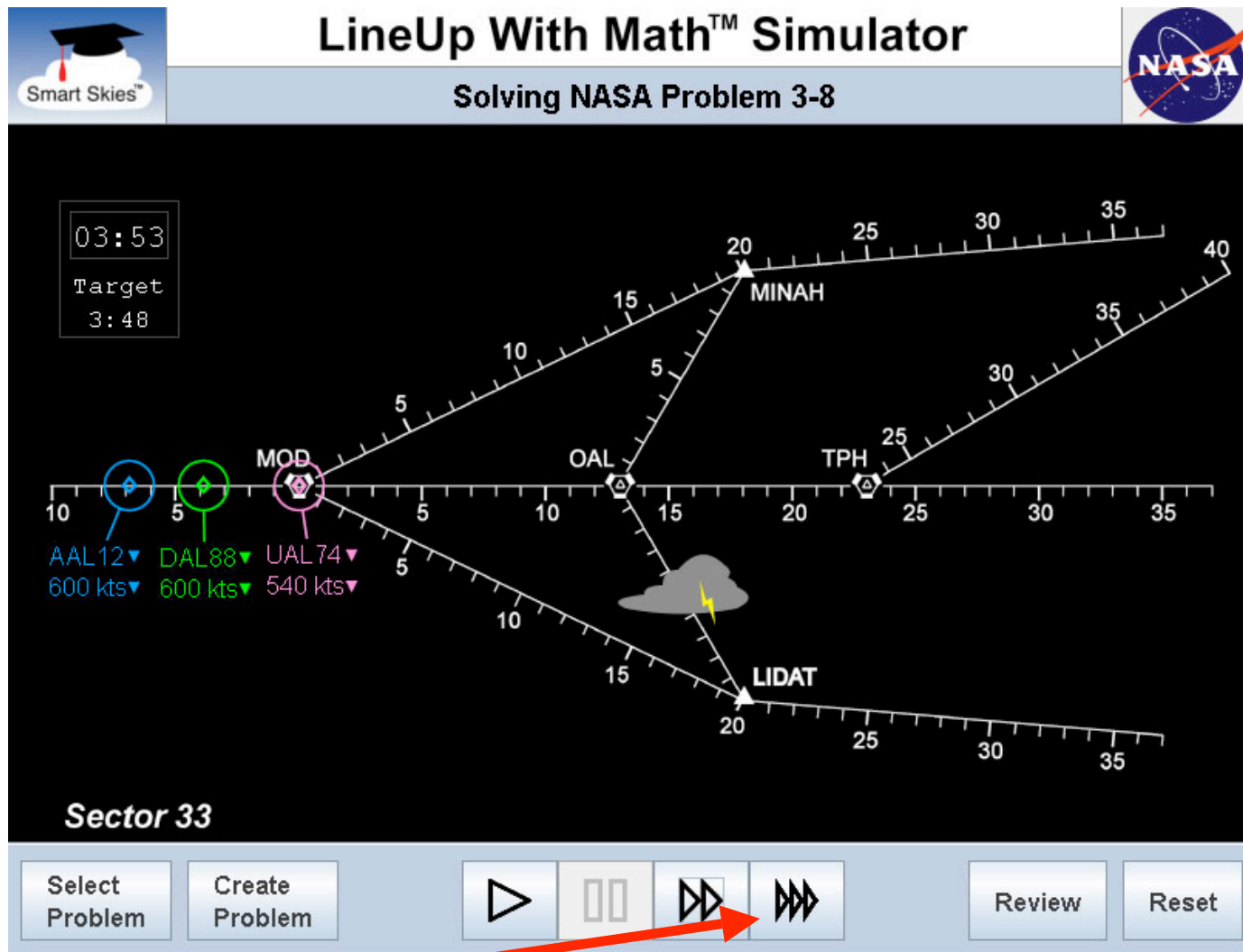
- ❑ Discuss, then change route of AAL12 to shorten distance to MOD by 3 NM (which is target spacing at MOD).
- ❑ Note: AAL12 is 3 NM closer to MOD than DAL88.

6. Change a Speed



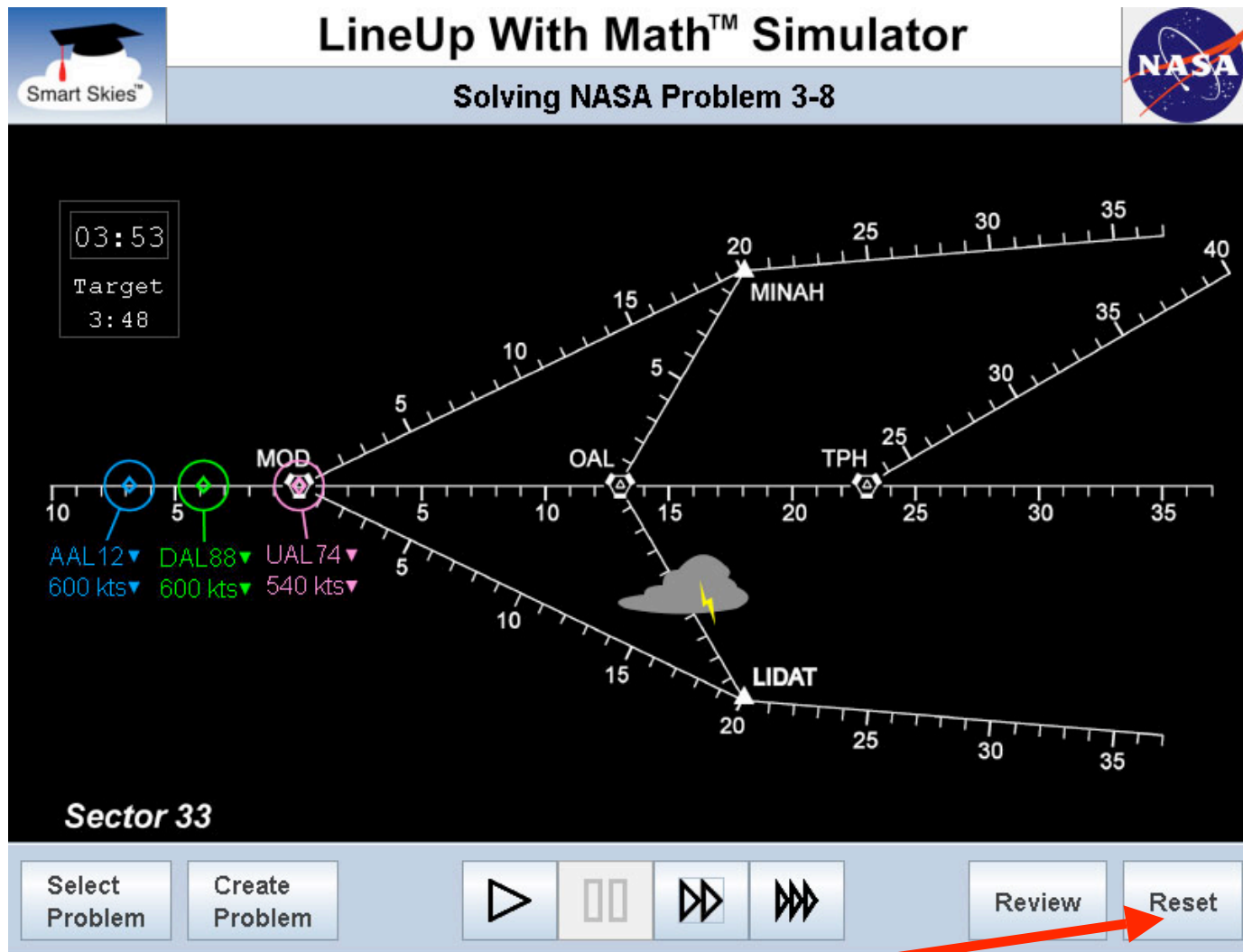
- ❑ Discuss, then reduce speed of UAL74 to try to get 3 NM spacing behind DAL88 at MOD. Try 540 knots.

7. Note the Results at MOD



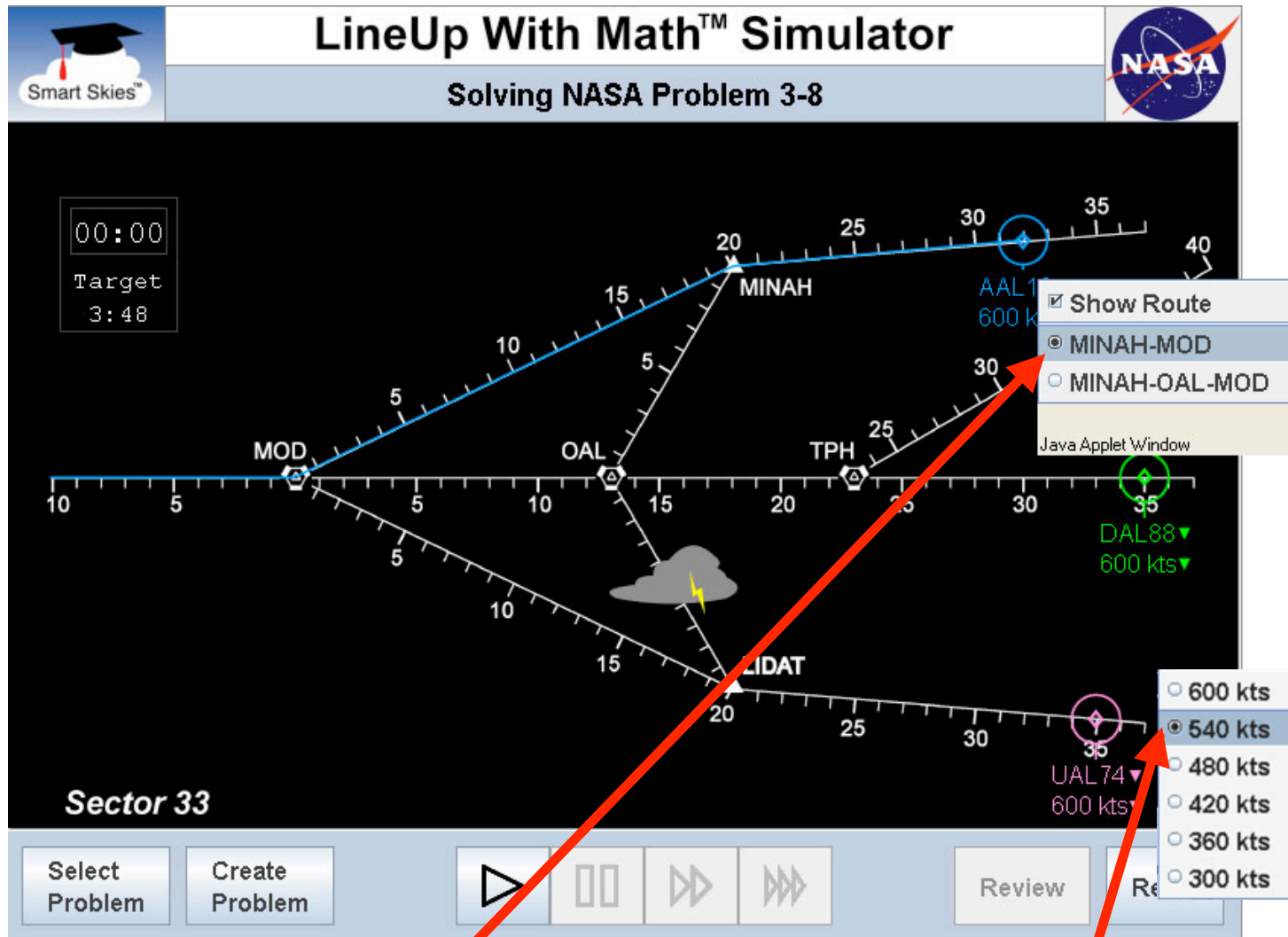
- ❑ Fast forward to show results at MOD. Target spacing = 3 NM.
- ❑ DAL88 is 3 NM behind AAL12. UAL84 is more than 3 NM behind DAL88.
- ❑ Time of UAL74 crossing MOD exceeds target time.

8. Reset and Try Again



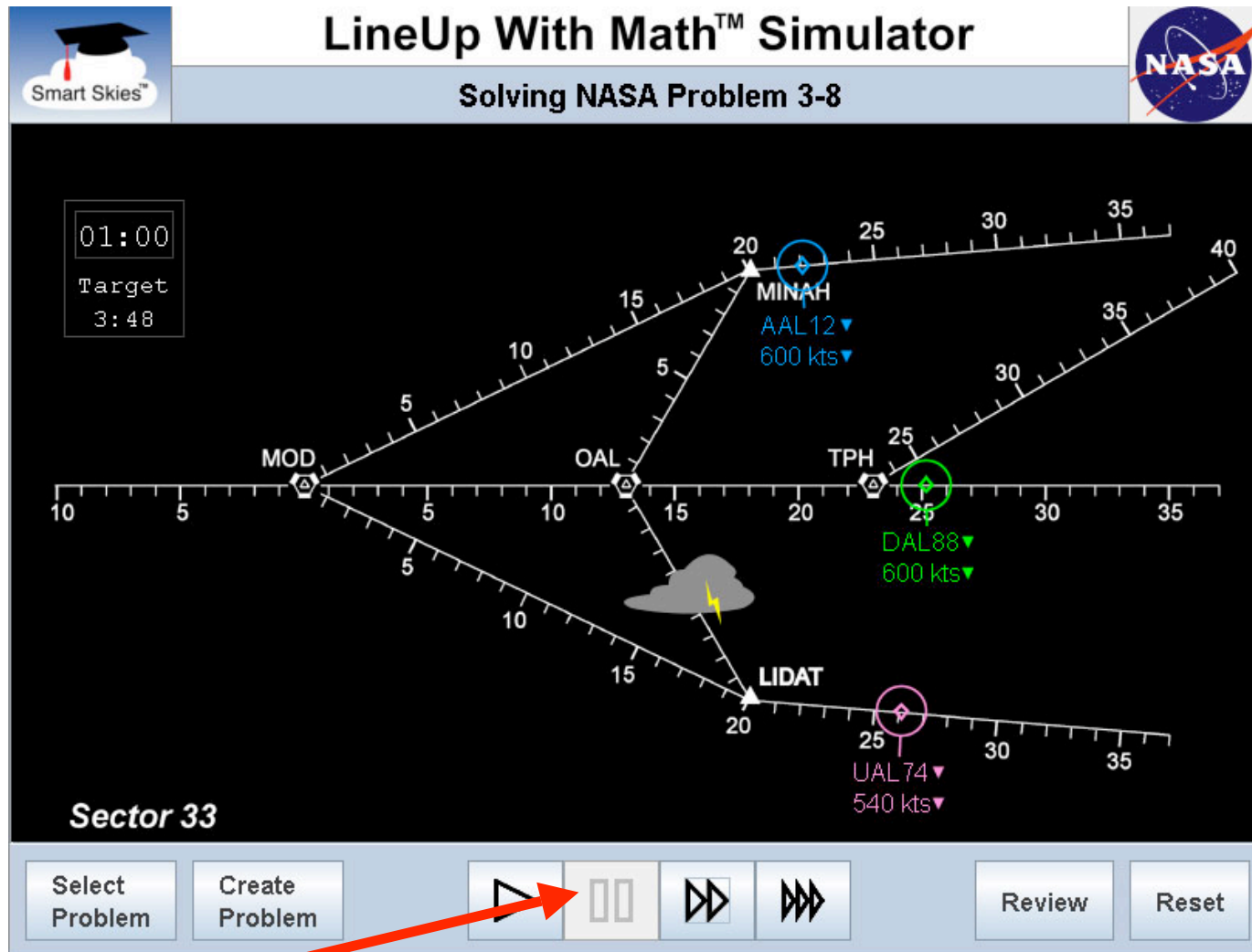
❑ Click the Reset button.

9. Change Route & Speed as Before



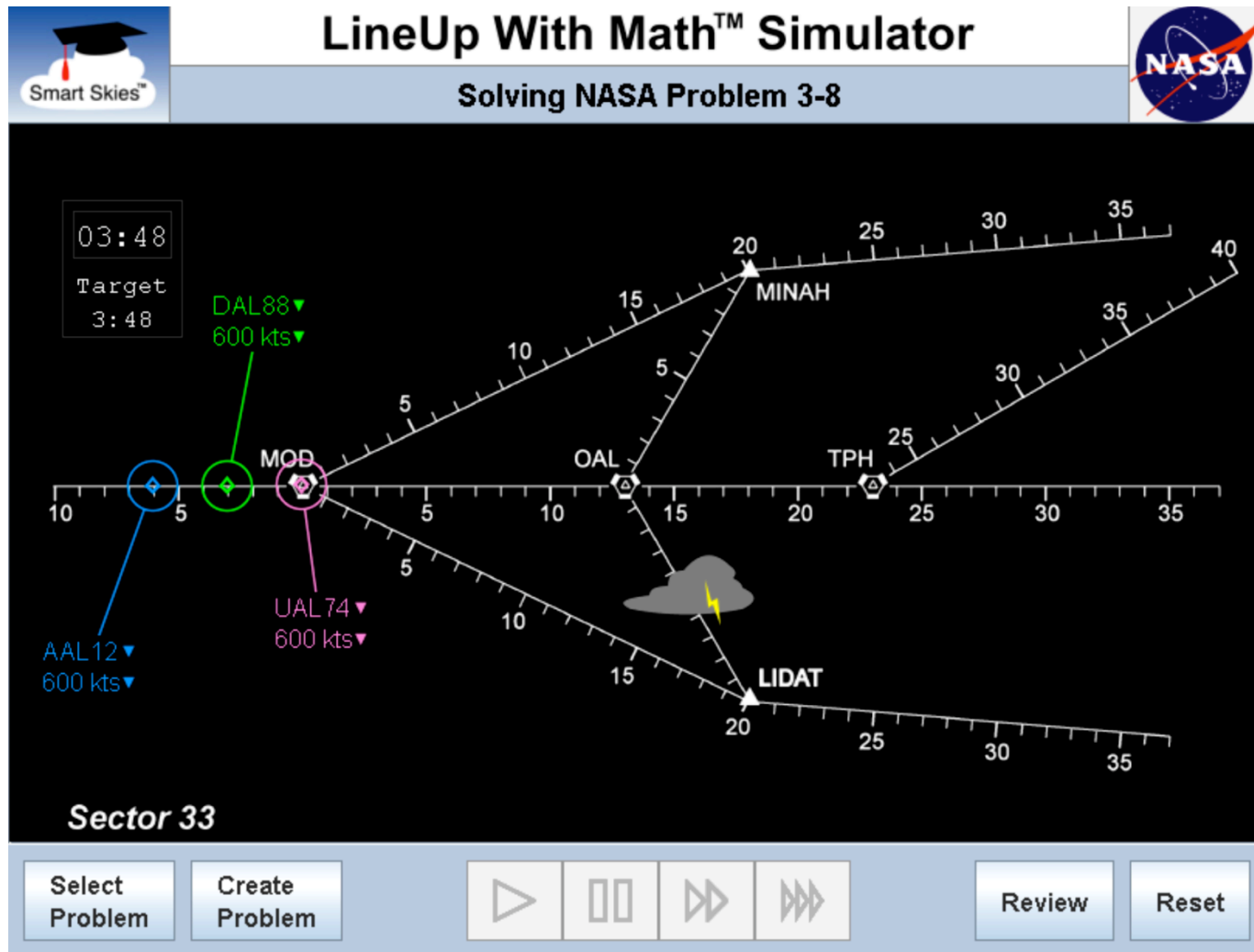
- ❑ Change route of AAL12 to be direct from MINAH to MOD.
- ❑ Reduce the speed of UAL74 to 540 knots.

10. After 3 Minutes, Speed Up UAL74



- ❑ Run the Simulator and pause at 1 minute, 2 minutes, 3 minutes.
- ❑ Note: UAL74 falls back 1 NM each minute.
- ❑ At 3 minutes, speed up UAL74 to 600 kts and run to completion.

11. Target Spacing & Time Have Been Met



□ 3 NM spacing has been achieved with the last aircraft at MOD by 3:48.